HYDROMETER

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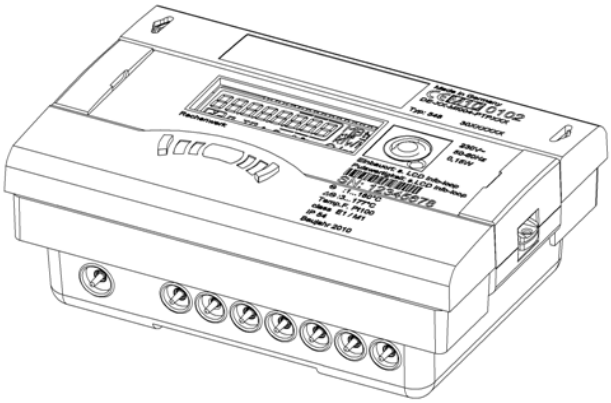
SCYLAR INT 8

Communication description



MBus ID = 0x52

Changes to be reserved

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DIEHL Metering

Contents

1 Introduction

The M-Bus (Meter Bus) is a European standard for remote reading of meters. It can be used for all types of consumption meters and for various sensors and actuators.

This document does not deal with the M-Bus protocol in detail. Further information about this can be found on the Internet at www.m-bus.com.

The RS-485 / RS-232 communication module is a serial interface for communication with external devices, e.g. a PC.

2 Communication interfaces

SCYLAR INT 8 is equipped with five communication interfaces:

- Optical ZVEI
- M-BUS: M-Bus communication is over a two-wire line.
- Integrated radio function with 868MHz or 434MHz.

- RS-485: The module contains a 4-pole terminal strip with terminals marked D+, D-, Vcc and GND. An external supply of 12Vdc ±5V <5W is needed for module.
- RS-232: The module board contains a 3-pole terminal strip with terminals marked DAT, REQ and GND (ground). This connection can be used in conjunction with the HYD cable adapter for PC communication.

2.1 Communication priorities

Mutual influence of interfaces:

Interface	Priority
Optical ZVEI	1
M-Bus	2

Interface	Priority
Optical ZVEI	1
RS-485 / RS-232	2

The M-Bus and RS-485, RS-232 interfaces can no longer be used at port 1 during optical communication whereas port 2 can still be used for communication.
Port 2 is no longer being usable if integrated radio is active.

2.2 Telegram format

Communication complies with:

- IEC 870-5-1 Telecontrol equipment and systems; Transmission protocols; Section One - Transmission frame formats.

2.3 UARTBaud rates

- M-Bus: 300 and 2400 baud, 8E1
  automatic baud rate switching
- RS-485: 300 and 2400 baud, 8E1
- RS-232: 300 and 2400 baud, 8E1
- ZVEI optical: 2400 baud, 8E1

2.4 Protocol layer

1. EN 13757-3
2. Data output
   a) Variable protocol
   b) “Least Significant Byte first” (mode 1) for multi-byte variables
   c) All response telegrams also available for C1 errors

2.5 Connection set-up for optical ZVEI

To activate the optical ZVEI interface, a ‘0’ - ‘1’ bit pattern must be sent continuously at 2400 bauds for 2.2 s (= 480 bytes + $55 + 8 data bits + no parity + 1 stop bit). The actual communication can be started after a pause of 11 to 330 bit times (2400 bauds).

2.6 Connection set-up for M-Bus / RS-485 / RS-232

After connection to the M-Bus/RS-485/RS-232, the TSS721 interface module is ready for reliable communication.

2.7 Addressing

The integrator can be addressed using two addressing variants: with a logic address (primary address) or by using a filter via its ex works identification (secondary address).

2.7.1 Selection (secondary address)

Request telegram:	68 0B 0B 68 53 FD 52 NN NN NN NN HH HH ID MM CS 16
Response:	E5 (only if filter matches)

Structure of filter:

4-byte BCD	NN (serial number)	$F digit joker
2-byte HST	HH (manufacturer code)	$FF byte joker
1-byte ID (SCYLAR INT 7: $01)	ID (ident. code)	$FF joker
1-byte SMED	MM (medium code)	$FF joker

After selection, the integrator behaves as if it also had the primary address $FD and can therefore be operated via the primary address $FD (response always with own primary address).

2.7.2 Deselection

Request telegram:	10 40 FD CS 16
Response:	E5

To reliably end communication with the selected integrator, the integrator must be deselected or by using a selective wrong filter.

3 Reading integrator:

Procedure:

1. Define response – “Define response values”
2. Request response
3. Interpretation of data

3.1 Standard data reading (Application Reset 0)

The integrator is always read using a long frame with the following structure:

To make sure the default value “00” (All) is obtained, an Application Reset should be carried out with subcode “00”:

SND_UD: “68 04 04 68 **73/53** **FD** **50** **00** **CS** 16”

C-field: **73** or **53**

Address field: e.g. **FD** (equiv. to 254)

CI-field: **50**

Application Reset Subcode: **00**

“00” corresponds to “All” – (*see Appendix 1)*

or e.g. “20” corresponds to “Simple Billing”

Checksum: **CS**

3.2 Request response

The following command must be sent to obtain a response from the integrator:

Request telegram		**Response**
REQ_UD2	10 7B AA CS 16	RSP_UD

3.3 Interpretation of data

The data received basically corresponds to the protocol structure of EN 13757-3 as for example the definition of units.

4 Customer telegram

Registers can be read or programmed direct in the integrator using subtables.

The IZAR-SET program from HYDROMETER can be used to set the customer telegram.
This program can be downloaded from the HYDROMETER website:

http://www.hydrometer.com/systeme/download.html

5 Parametrization of integrator

The integrator is equipped with a number of registers that can be set without breaking the calibration seal.

5.1 Structure of instruction set

Byte	Meaning	Description/content/value
	Header Long Frame (HLF)	
HLF 1	1st start character	$68
HLF 2	Long field	3 + x
HLF 3	Long field	3 + x
HLF 4	2nd start character	$68
HLF 5	C-field	$53 SND_UD
HLF 6	A-field	(Bus) address of integrator
HLF 7	CI-field	$51 data send mode 1
	Variable Data Blocks (VDB)	
VDB 1.. VDB x		
	End of Long Frame (ALF)	
ALF 1	Checksum	
ALF 2	Stop character	$16

5.2 Date and time

The date and time can be changed with the following telegram:

Send: $68 $09 $09 $68 $53 $FE $51 **$04 $6D [Date Time (4-Byte M-Bus Type F)]** Check $16

Example:

$68 $09 $09 $68 $53 $FE $51 **$04 $6D $0F $0A $CF $05** $00 $16

Read: $E5

5.3 New primary address

If VBD1 = $01 and VDB2 = $7A, VDB3 is used as new primary address.

Send: $68 $06 $06 $68 $53 $FE $51 **$01 $7A [Address]** Check $16

Example (address 5):

$68 $06 $06 $68 $53 $FE $51 **$01 $7A $05** $22 $16

Read: $E5

Special cases:

A-field	Function	Use
$FD	Code for secondary addressing	Secondary addressing
$FE	Broadcast (to all) with response	Only one integrator connected
$FF	Broadcast (to all) without response	System-wide control

5.4 Serial number / customer number

The new integrator number NNUM can be defined with the following telegram:
4 byte BCD

Send: $68 $09 $09 $68 $53 $FE $51 **$0C $79 [NNUM] Check** $16

Example (SN 12345678):

$68 $09 $09 $68 $53 $FE $51 **$0C $79 $78 $56 $34 $12** $3B $16

Read: $E5

Note: The NNUM is part of the secondary address.

5.5 New accounting date 1

If VBD1 = $44, VDB2 = $ED and VDB3 = $7E, VDB4 and VDB5 are used as new next reading date (data type F).

Send: $68 $0A $0A $68 $53 $FE $51 **$42 $EC $7E [Set Accounting Date1] Check** $16

Example:

$68 $0A $0A $68 $53 $FE $51 **$42 $EC $7E $C1 $05** $17 $16

Read: $E5

5.6 New accounting date 2

If VBD1 = $84, VDB2 = $ED and VDB3 = $7E, VDB4 and VDB5 are used as new next reading date (data type F).

Send: $68 $0B $0B $68 $53 $FE $51 **$C2 $01 $EC $7E [Set Accounting Date1] Check** $16

Example:

$68 $11 $11 $68 $53 $FE $51 **$C2 $01 $EC $7E $DF $0C** $7D $16

Read: $E5

5.7 Pulse input counter 1

If IMPIN1PL = 0, IMPCNT1 can be changed. This programming facility can be disabled by HYD!
4 byte BCD

Send: $68 $0B $0B $68 $53 $FE $51 **$8C $40 $FD $3A [Set IMPCNT1]** Check $16

Example (55667788):

$68 $0B $0B $68 $53 $FE $51 **$8C $40 $FD $3A $88 $77 $66 $55** $5F $16

Read: $E5

5.8 Pulse input counter 2

If IMPIN2PL = 0, IMPCNT2 can be changed. This programming facility can be disabled by HYD!

4 byte BCD

Send: $68 $0C $0C $68 $53 $FE $51 **$8C $80 $40 $FD $3A [Set IMPCNT1]** Check $16

Example (66554433):

$68 $0C $0C $68 $53 $FE $51 **$8C $80 $40 $FD 3A $33 $44 $55 $66** $57 $16

Read: $E5

5.9 Clearing operating days

If NCLROTC = 0, ONTIME can be cleared in the field by communication.
2 byte BCD

Send: $68 $07 $07 $68 $53 $FE $51 **$0A $27 [clear operating days]** Check $16

Example (clearing):

$68 $07 $07 $68 $53 $FE $51 **$0A $27 $00 $00** $D3 $16

Read: E5

5.10 Clearing error hour counter

If NCLREDC = 0, ERRDAY can be cleared in the field by communication.
2 byte BCD

Send: $68 $07 $07 $68 $53 $FE $51 **$0A $AC $18 [clear Fehlerstunden]** Check $16

Example (clearing):

$68 $07 $07 $68 $53 $FE $51 **$0A $AC $18 $00 $00** $02 $16

Read: E5

5.11 Monthly values (last month)

The monthly memory with a capacity of 24 months is located in the EEPROM at address 0x1880 0x28FF with 64 bytes per month. The address per month are located at 0x1880, 0x18C0, 0x1900, 0x1940, 0x1980, ….. 0x1E00, 0x1E40.

Each entry has the following structure:

Value	Size	Type	Address
• Date time stamp	2 Byte	MBus type G	0
• Energy resolution last digit LCD	4 Byte	BCD	2
• Tariff register 1	4 Byte	BCD	6
• Tariff register 2	4 Byte	BCD	10
• Tariff definition 1	2 Byte	HY spec.	14
• Tariff definition 2	2 Byte	HY spec.	16
• Volume resolution last digit LCD	4 Byte	BCD	18
• Error hour counter	1 Byte	BCD	22
• Maximum monthly flow rate	3 Byte	BCD	23
• Time maximum monthly flow rate	2 Byte	MBus type F (Lbyte)	26
• Date maximum monthly flow rate	2 Byte	MBus type G	28
• Maximum monthly power resolution last digit LCD	4 Byte	BCD	30
• Time maximum monthly power	2 Byte	MBus type (Lbyte)	34
• Date maximum monthly power	2 Byte	MBus type G	36
• Pulse input counter 1 (volume)	4 Byte	BCD	38
• Pulse input counter 2 (volume)	4 Byte	BCD	42
• Definition pulse input counter 1	1 Byte	HY spec.	46
• Definition pulse input counter 2	1 Byte	HY spec.	47
• ONTIME (operating hour counter)	2 Byte	BCD	48
• Maximum value forward flow temperature	2 Byte	HEX (0.1℃ res)	50
• Time maximum value forward flow temperature	2 Byte	MBus type F (Lbyte)	52
• Date maximum value forward flow temperature	2 Byte	MBus type G	54
• Maximum value return flow temperature	2 Byte	HEX (0.1℃ res)	56
• Time maximum value return flow temperature	2 Byte	MBus type F (Lbyte)	58
• Date maximum value return flow temperature	2 Byte	MBus type G	60

5.11.1 Reading

Write read pointer to address

AppResSubCode 0xC0

Collect data (read pointer is always incremented by data block size)

- Check address, possibly wrong if communication error
- Interpret response

5.11.2 Deleting

Deletion is not possible in the field.

5.12 Deleting error log

The event memory with a capacity of 127 entries is located in the EEPROM at address 0x1680 to 0x1880, with 4 bytes per entry. The administration data is located at address 0x00.

address:	EEPROM
communication address:	0x1680
EEPROM address:	0x280
size:	0x200

example:

address	value	type
0x1680	index content next storrage	hex mask = 0x7C
0x1682	date last delete	MBus type G
0x1684	index content “0”	
0x1688	index content “1”	
….	….	
0x1880	index content “127”	

every entry is structured as follows:

1. byte	2. byte	3. byte with event	4. byte mit source
date MBus Typ G		0x01 C-1 checksum error 0x02 E-8 mains supply lack backup 0x04 E-1 error temperature-measuring 0x20 leakage error at input 1 0x40 leakage error at input 2 0x80 protection seal	0x1F hour 0x20 low bit SFCNT 0x40 reset ONTIME or ERRHOUR

5.12.1 Reading

Write read pointer to address

AppResSubCode 0xC0

Collect data:

- Check address, possibly wrong if communication error
- Interpret response

5.12.2 Setting read pointer

Send:

$68 $0D $0D $68 $53 $FE $51 $2F $0F **$00 $01 $6E $03 $03 [AdrLo AdrHi] $80** Check $16

Example (0x1880):

$68 $0D $0D $68 $53 $FE $51 $2F $0F **$00 $01 $6E $03 $03 $80 $18 $80** Check $16

Read: $E5

6 Appendix 1

Application Reset Subcode:

Application Reset Subcode	Telegram data
„0“ “All” #0X00	Current energy Current tariff register 1 Current tariff register 2 Current volume Current power Current flow Current forward temperature T_H @ EBKAELTE Current return temperature T_C @ EBKAELTE Current temperature difference Current operating days Current date and time Accounting date 1 (memory number = 1) • Energy • Volume • Tariff register 1 • Tariff register 2 • Date • Next accounting date 1 Accounting date 2 (memory number = 3) • Energy • Volume • Tariff register 1 • Tariff register 2 • Date • Next accounting date 2 Pulse IN register • Current pulse input counter 1 • Current pulse input counter 2

„1“ “User data” #0X10	Current energy Current tariff register 1 Current tariff register 2 Current volume Current power Current flow rate Current forward temperature T_H @ EBKAELTE Current return temperature T_C @ EBKAELTE Current temperature difference Current operating days Current date and time Accounting date 1 (memory number = 1) • Energy • Volume • Tariff register 1 • Tariff register 2 • Date • Next accounting date 1 Accounting date 2 (memory number = 3) • Energy • Volume • Tariff register 1 • Tariff register 2 • Date • Next accounting date 2 Accounting date 1 last year (memory number = 2) • Energy • Volume • Tariff register 1 • Tariff register 2 • Date Accounting date 2 last year (memory number = 4) • Energy • Volume • Tariff register 1 • Tariff register 2 • Date

„2“ “Simple billing” #0X20	As 1 or Current date and time Current energy Current tariff register 1 Accounting date 1 (storage number = 1) • Energy • Tariff register 1 • Date • Date next accounting date 1 Current volume Current forward temperature T_H @ EBKAELTE Current return temperature T_C @ EBKAELTE Current flow rate Current power GLYKOL TEXT PULSE TEXT TENR HistoryLog2 data
„3“ “Enhanced billing” #0X30	Current energy Current volume Current flow rate Current forward temperature T_H @ EBKAELTE Current return temperature T_C @ EBKAELTE Current tariff register 1 Current error hour counter Current pulse input counter 1 Current pulse input counter 2 Tariff limit 2 reached
„4“ “Multi-tariff billing” #0X40	Current energy Current volume Current tariff register 1 Current tariff register 2 Current pulse input counter 1 (at pulse input mounted) Current operating days Error hour counter Current flow rate Current power Current forward temperature T_H @ EBKAELTE Current return temperature T_C @ EBKAELTE Date of last monthly memory Energy of last monthly memory Volume of last monthly memory Pulse counter 1 of last monthly memory Tariff energy 1 of last monthly memory Operating days of last monthly memory Error hour counter of last monthly memory

„5“ “Instanteous values” #0X50	Current energy Current tariff energy 1 Current tariff energy 2 Current volume Current power Current flow rate Current forward temperature T_H @ EBKAELTE Current return temperature T_C @ EBKAELTE Current operating days Current error hour counter
„6“ “Load management values for management” #0X60	Proprietary data number: 4 -> $0F $04 SWVER READPTR READLEN Bytes • Application reset subcode = 0x60 makes READPTR = 0x2900 and READLEN = maximum possible length • READPTR is automatically incremented by READLEN for every REQ_UD2
„7“ “Reserved” #0X70	As 1
„8“ “Installation and startup” #0X80	Current date and time ($04 $6D DTFZEIT) Next accounting date 1 Next accounting date 2
11 “Manufacturing” #0XB0	Proprietary data number: 4 -> $0F $04 SWVER READPTR *READLEN Bytes* • Application reset subcode = 0xB0 makes READPTR = 0x200 and READLEN = maximum possible length • READPTR is automatically incremented by READLEN for every REQ_UD2
12 “Development” #0XC0	As 11 without Init READPTR and READLEN
13 “Selftest” #0XD0	Current energy Current date and time
14 “Reserved” #0XE0	As 0
15 “Reserved” #0XF0	RAMTEL